Group D, Day One, Problems

Energy Problems

Row 1, Extraction

- 40,000 oil and gas wells in eastern US
  - Problem with management of low quality produced waters
  - Cost increasing for disposal
  - Location
- NG—Western Colorado
  - Factorization/increased recovery impact on fresh water
- CBM—LA/Great Lakes (long-term problem)
  - Large quantity
  - Variable quality
- Geothermal
  - New technology – economic viability/technical feasibility

Row 3, Electricity Generation

- Thermal-Electric Open vs closed cycle
  - Return to system?
  - Trade-off vs. whole cycle
- Maximize production efficiency of water
  - Hydro example: new turbine, increase efficiency 5-10%
  - When operate dam? Maximize benefits. Reference rules of operation. Don't reflect available due to climate change. Demands have evolved—recreation.
  - Demand—weather forecasting.

Row 4, Renewables, Long-term

- Biobased fuel
  - Water limit?
  - Cost dependent
- Need new technologies
  - Tidal/wave/OTEC
  - Near-shore wind
  - Near-shore coastal environment
  - Coastal circulation
  - Wave impact
  - Recreational
  - Navigation
  - Water production—OTEC

Row 5, Other, Near-term

- Lack of data on potential contributions of alternatives
- Lack of incentives leading to sustainable development

- Lack of Integrated Resource Planning

Row 5, Other, Long-term
- Lack of investment in new/innovative technologies
- Uncertainty in the demand/supply balance
- Biobased fuels' impact on water demand
- Hydrogen/alternative fuels

- Lack of adequate interest and investment in developing innovative energy technologies
- Need to look beyond conventional US application
    - Offshore/global economy
- DOE leadership
    - Invest in more supply/efficient technologies
    - % of budget for high risk/high payoff
    - Improve communications between DOE and Industry
        - Renewable energies

Water Problems

Water Problems, Short-term
- Lack of supply and consumption data
- Lack of public knowledge (no perceived threat)
- Global food/water/energy tradeoffs

Water Problems, Long-term
- Value of water
- Regulatory environment
- Infrastructure improvements
- Brackish/desal/water reuse cost reduction
- Regional approach to water allocation

Allocation of water resources from state-to-state

Availability
- We don't know how much water is available/allocatable for energy
    - How dynamic is "the number"

Data monitoring/maintain water database
- How much water is used?
    - Lack of data
    - Regional/national
    - Can't manage what you don't know

  - Energy imbedded in water (boundary issue)
  - Environmental data
  - Insufficient "science"

Increasing degradation of water (first surface, then ground)

- Increase in energy consumption due to treatment

Allocation of water during extreme ranges of supply

- Primarily surface

Groundwater data

- Synthesis
- Understanding relationships
- USGS—need funding
- Quality and quantity data needed

How much conservation/efficiency is possible?

- Technology contribution
- Establish metrics/lack of common metrics

Urban Use

- Management of storm and wastewater
- Efficient use of storm and wastewater
- Who pays?
- Regulatory environment
- Energy consumption increase with increased water treatment

Requests for inter-basin transfers are increasing

- Water rights issue
- Water allocation
- British model/water supply regions based on watersheds
- Surface/groundwater interaction

Cross-cutting Problems

Value of energy/water

- Who sets value
- Water is "cheap"
- For future generations
- Who manages
- Who speaks for non-use values

Supply

- Leakage in distribution system—60%
- Unaccounted for water varies in impact between system

- Aging infrastructure
  - $280 billion
  - AWAARF future study
- Expensive pumping

Ground/surface water interface
- Local data/technology uncertainty
- How much is available?

How do we want to use water? National issue
- Grow food vs use water for ??
- Land resource use vs ecosystem/environmental protection
- Recognize unique water attributes
  - Timing
  - Amount
  - Location